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(54) CYLINDER LATCHING MECHANISM FOR REVOLVER

TROMMELVERRIEGELUNGSMECHANISMUS FÜR EINEN REVOLVER
MÉCANISME DE DÉTENTE DE BARILLET POUR RÉVOLVER

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(56) References cited:

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention generally relates to firearms, and more particularly to a cylinder retaining or latching mechanism for a revolver.

[0002] Revolvers typically include a cylinder frame which rotatably supports a revolving cylinder with a plurality of chambers for holding cartridges and a grip frame that provides a structure for mounting and supporting a hand grip attached thereto at the rear of the revolver. The barrel of the revolver is also mounted to the front of or forms part of the cylinder frame.

[0003] In some designs such as heavy duty revolvers capable of firing magnum-type loads, a strong one-piece integral frame construction is often preferred which combines both the cylinder and grip frames into one integral unit for added durability needed to sustain the shock loads and recoil resulting from firing such high-caliber revolvers.

[0004] US Patent No. 6,574,898 shows a typical one-piece revolver frame. Other know designs such as the revolver shown in 6,928,763 utilize a two-piece frame construction in which a separate structurally light and relatively thin grip frame is attached to the more robust cylinder frame which absorbs the bulk of the recoil forces. In such two-piece designs, the grip frame provides not much more than a narrow skeletal framework for mounting a hand grip thereto. The firing control mechanism components including the hammer, trigger, pawl, and related parts are mounted together in a firing control housing that typically is formed as an integral part of the substantially heavier cylinder frame. The firing control housing is typically located in the rear of the cylinder frame since these components operably interact with and therefore must be located proximate to the rear of the cylinder for striking a chambered cartridge. In practice, it is difficult to achieve proper alignment and meshing between the trigger and hammer operably coupled thereto if these firing control components were mounted in separate frames. To withstand the shock and stresses associated with firing the revolver, the cylinder frame including the firing control housing have traditionally been made of metal such as steel or aluminum.

[0005] Reducing the weight of the component support structures for firearms and therefore the overall weight is desirable for making the firearm easier for a user to carry. This is especially true for compact concealed-carry firearms where weight is an important consideration. However, both cylinder and sometimes separate grip frames used heretofore for revolvers have traditionally been made completely of metal. This is largely because the firing control components were mounted in the firing control housing portion of the cylinder frame, which necessarily is made of metal. Because the metal cylinder frame is far heavier than the grip frame even in two-piece revolver frame constructions, there was little weight saving possibly by simply making the grip frame of a lighter material. Although semi-automatic pistols have used non-metallic polymer grip frames in combination with metal reciprocating slides mounted thereon, the concept of using dual materials in revolvers has not been used heretofore because of the limited potential gains in weight reduction achievable using the foregoing conventional revolver construction with mounting the firing control components in the cylinder frame. Previous use of non-metallic material such as polymers in revolvers has been largely limited to the non-structural handgrips which typically are attached to the metal grip frame via threaded fasteners. Accordingly, an improved revolver component support structure and firing control arrangement is desired.

[0006] US Patent No. 4,228,606 (CASULL) discloses improved means for releasably locking the cylinder of a small, single action revolver in proper rotatable position within the frame of the revolver. A cylinder axis pin is adapted to extend through a first bore in the front portion of the frame, then through a central bore in the cylinder, and into a bore in the rear portion of the frame which is axially aligned with the first bore. US Patent No. 4,934,081 (MOONEY) discloses a retainer for a revolver yoke stud including a screw portion with spring and pin defect carried thereby in a unitary assembly. The yoke stud includes an angular groove with a chamfered surface adapted to be engaged by the tapered end of the pin. US Patent No. 3,685,193 (SEFRIED) discloses a revolver having a cylinder that is rotatably mounted on the cylinder pivot shaft of the cylinder crane is provided with means for retaining the cylinder on the cylinder pivot shaft when the cylinder and cylinder crane are swung outwardly to their open position.

SUMMARY OF THE INVENTION

[0007] According to one aspect of the present invention there is provided a cylinder latching mechanism for a revolver according to appended claim 1. According to another aspect of the present invention there is provided a revolver according to appended claim 8. According to yet another aspect of the present invention there is provided a method of retaining a cylinder latching mechanism in a revolver according to a appended claim 9. In one embodiment, a revolver is provided that includes a cylinder frame for rotatably carrying the cylinder and a separate firing control housing for mounting and supporting the firing control mechanism components operably associated with the cylinder for discharging the revolver. In one embodiment, the cylinder frame is made of metal while the firing control housing preferably is made of a light-weight non-metallic material, and more preferably in one embodiment is made of a polymer possessing a combination of high strength and toughness. In one embodiment, the rear of the firing control housing includes an elongated rear grip tang for mounting a hand grip thereto.
Advantageously, in contrast to aluminium which is sometimes used for revolver frames, a polymer-based firing control housing frame for example, according to the preferred embodiment has approximately equal strength to some aluminium alloys with only approximately half of the weight. Furthermore, since the firing control housing is not part of the heavier metal cylinder frame as in known revolver designs, the length of the cylinder frame can be truncated and shortened to allow more of the component support structure to be made from the lighter weight non-metallic material. The preferred embodiment therefore offers a revolver in the same overall unit size to the user at a significantly reduced total weight compared with known all metal revolvers. In addition, a contrasting and/or textured non-metallic firing control housing such as one made of a dark or otherwise colored polymer provides an aesthetically interesting and pleasing appearance to many users not seen heretofore in all metal frame revolver designs having a substantially uniform appearance in color and texture.

According to another embodiment, a solid-frame revolver with lateral or side swing-out cylinder is provided that includes a cylinder latching system or mechanism for locking the pivotally movable cylinder into a supportive cylinder frame. Such revolver designs typically include a cylinder swing arm or crane to pivotally mount the cylinder to the cylinder frame for loading cartridges into or removing spent cartridge casings from the cylinder. In one embodiment, a cylinder latching mechanism for a revolver includes a cylinder rotatably mounted in a frame and a spring-loaded plunger engageable with the cylinder or a component operably associated with the cylinder, such as without limitation an ejector in one embodiment. The plunger is moveable from a locked position to an unlocked position to release the cylinder. In a preferred embodiment, the plunger may be sidely disposed in a cavity in the cylinder frame and retained therein by a retaining member such as a retaining plug locked into the frame by an interference fit between a barrel insert and the retaining plug.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The features of the preferred embodiments will be described with reference to the following drawings where like elements are labeled similarly, and in which:

- FIG. 1 is a left side cross-sectional view of one embodiment of a revolver with a separate firing control housing;
- FIG. 2 is a right side cross-sectional view of the revolver of FIG. 1;
- FIGS. 3 is a right side cross-sectional view of the firing control housing of the revolver of FIG. 1 with firing control components mounted therein;
- FIG. 4 is a right side view of the firing control housing of the revolver of FIG. 1 with firing control components mounted therein;
- FIG. 5 is a right side perspective view of the firing control housing of the revolver of FIG. 1 with firing control components mounted therein;
- FIG. 6 is an exploded front perspective view of the revolver of FIG. 1;
- FIG. 7 is a close-up cross-sectional side view of the barrel portion of the revolver of FIG. 1.
- FIG. 8 is a rearward-looking exploded perspective view of the barrel portion of the revolver of FIG. 1;
- FIG. 9 is a forward-looking exploded perspective view of the barrel portion of the revolver of FIG. 1;
- FIG. 10 is left side perspective view of the firing control housing of the revolver of FIG. 1 with firing control components mounted therein; and
- FIG. 11 is an exploded rear perspective view of the revolver of FIG. 1.

**DESCRIPTION OF PREFERRED EMBODIMENTS**

The features and benefits of the invention are illustrated and described herein by reference to preferred embodiments. This description of preferred embodiments is intended to be read in connection with the accompanying drawings, which are to be considered part of the entire written description. In the description of embodiments disclosed herein, any reference to direction or orientation is merely intended for convenience of description and is not intended in any way to limit the scope of the present invention. Relative terms such as "lower," "upper," "horizontal," "vertical," "forward," "rearward," "front," "back," "above," "below," "up," "down," "top" and "bottom" as well as derivative thereof (e.g., "horizontally," "downwardly," "upwardly," etc.) should be construed to refer to the orientation as then described or as shown in the drawings under discussion. These relative terms are for convenience of description only and do not require that the apparatus be constructed or operated in a particular orientation. Terms such as "attached," "affixed," "coupled," "connected" and "interconnected," refer to a relationship wherein structures are secured or attached to one another either directly or indirectly through intervening structures, as well as both movable or rigid attachments or relationships, unless expressly described otherwise. Moreover, the features and benefits of the invention are illustrated by reference to the preferred embodiments. Accordingly, the invention expressly should not be limited to such preferred embodiments illustrating some possible nonlimiting combination of features that may exist alone or in other combinations of features; the scope of the invention being defined by the claims appended hereto.

Referring to FIGS. 1, a revolver 10 in the form of a double-action solid-frame revolver is shown as including a cylinder frame 12 with cylinder 16 rotatably carried by frame 12 and defining a plurality of chambers 13 formed inside therein for holding cartridges. Cylinder 16 is supported by a cylinder crane 180 including an upper support tube 101 received through the hub 160 of the cylinder and a lower retaining pin 19 removably received...
through aperture 56 of the crane. Cylinder crane 180 is used to pivot cylinder 160 outwards from cylinder frame 12 from a ready-to-fire position wherein the cylinder is positioned in the frame and a chamber 13 may be aligned with barrel 140, to a lateral loading position for loading cartridges into chambers 13 wherein the cylinder is laterally displaced from the frame. Revolver 10 further includes barrel 140 extending forward from cylinder frame 12 and defining an internal bore 166 for receiving a bullet. In a preferred embodiment, barrel 140 includes a barrel insert 140 which defines bore 166 and is a separate component that is removably received in barrel mounting bore 79 of cylinder frame 12 (best shown in FIGS. 7 and 8) and supported by the frame as shown herein. In other embodiments, the barrel may be formed as an integral part of cylinder frame 12 (not shown). Preferably, barrel insert 140 is made of tough material such as steel that is capable of withstanding deflagration pressures from discharging revolver 10 and capable of withstanding the wear caused by the heat and friction of the bullet as it travels through the internal bore 166. In a preferred embodiment, cylinder frame 12 is preferably made of metal, and more preferably may be aluminum, titanium, or steel.

[0024] With continuing reference to FIGS. 1, 2, and 7, revolver 10 further includes a spring-loaded ejector 106 for ejecting spent cartridge casings from the revolver. Ejector 106 is disposed at the rear of cylinder 16 and is configured to operably engage the rim of a cartridge when disposed in each cylinder 13. An ejector rod 104 having a passageway disposed therethrough is coupled to ejector 106 and extends axially forward through cylinder 16. Ejector spring 103 biases ejector rod 104 forward and may be depressed by a user to ejector spent casing from revolver 10 in a conventional manner. In a preferred embodiment, ejector rod 104 preferably includes a forward-extending ejector rod extension 17 which is configured to engage an end cap 71 disposed thereon. Preferably, at least a portion of ejector rod extension 17 is externally threaded to engage complementary-configured internal threads on end cap 71, further described herein.

[0025] With reference to FIGS. 1 and 2, revolver 10 further includes a separate firing control housing 20 attached to the rear of cylinder frame 12 for mounting and housing the firing control components used to discharge and operate the revolver. In one embodiment, firing control housing 20 is removable and attachable to cylinder frame 12. In one embodiment, the rear of firing control housing 20 includes an elongated rear grip tang 22 for supporting and mounting a one-piece or two-piece hand grip (not shown) thereto. In one possible embodiment as shown, firing control housing 20 preferably may include a forward extending portion defining an integral trigger guard 23. In other embodiments, trigger guard 23 may be a separate component that attaches to firing control housing 20 and/or cylinder frame 12.

[0026] Preferably, firing control housing 20 may be made of a light-weight non-metallic material, and more preferably in one embodiment may be made from a polymer. In a preferred embodiment, firing control housing 20 includes barrel 140 extending forward from cylinder frame 12 and defining an internal bore 166 for receiving a bullet. In a preferred embodiment, firing control housing 20 includes an elongated rear grip tang 22 for supporting and operating the revolver. In one embodiment, firing control housing 20 includes barrel 140 extending forward from cylinder frame 12 and defining an internal bore 166 for receiving a bullet. In a preferred embodiment, firing control housing 20 is removably received in barrel mounting bore 79 of cylinder frame 12 (best shown in FIGS. 7 and 8) and supported by the frame as shown herein. In other embodiments, the barrel may be formed as an integral part of cylinder frame 12 (not shown). Preferably, barrel insert 140 is made of tough material such as steel that is capable of withstanding deflagration pressures from discharging revolver 10 and capable of withstanding the wear caused by the heat and friction of the bullet as it travels through the internal bore 166. In a preferred embodiment, cylinder frame 12 is preferably made of metal, and more preferably may be aluminum, titanium, or steel.

[0027] It will be appreciated that although firing control housing 20 is shown in application to a double-action revolver with an internal hammer 18, the invention may also be used with equal benefit for single-action and double-action revolvers having either internal hammers or hammers with an exposed spur that is manually cockable by a user. Accordingly, the invention is not limited to double action and/or internal spurless hammer revolver designs as illustrated by the preferred embodiment herein.

[0028] It will be appreciated that while a fiber reinforced polymer is the preferred material for the firing control housing, certain revolver cartridges generate very high firing pressures and resulting forces on the revolver frame. These may exceed the strength of the polymer fire control housing. Therefore, the invention is not limited to polymers but may include metals such as aluminum, titanium, or steel.

[0029] Fabricating firing control housing 20 from non-metallic materials such as polymers offers numerous possibilities for creating an aesthetically interesting and pleasing overall ornamental appearance for revolver 10 not available in many conventional revolver designs. For example, as best shown in FIG. 2, preferably non-metallic cylinder firing control housing 20 may be made darker in color than contrasting metallic cylinder frame 12. Thus, in some possible embodiments, firing control housing 20 may be dark grey or black in color. In other possible embodiments, however, the metallic cylinder frame may be darker (e.g. blued or blackened) whereas the firing control housing may be made of a contrasting lighter color in non-metallic material. In addition, in some embodiments, firing control housing 20 may have various surface textures such as graining, pebbling, dimples, etc. Accordingly, numerous ornamental color and texture combinations are advantageously possible for revolver 10 as a result of using non-metallic materials for firing control housing 20.

[0030] Firing control housing 20 may be mounted to cylinder frame 12 in any suitable manner. In one possible
embodiment as shown in FIGS. 1, 6, 7, and 11, firing control housing 20 may be mounted to cylinder frame 12 via an upper pinned connection 24 located generally behind cylinder 16 and a forward lower pinned connection 25 above trigger guard 23. In a preferred embodiment, upper pinned connection 24 may be formed by pin 94 received through two spaced-apart holes 92 in a pair of projections 162 extending from firing control housing 20 and a single hole 90 in a projection 164 on preferably cylinder frame 12 as shown. Since firing control housing 20 is preferably made of a non-metallic material such as polymer in a preferred embodiment while cylinder frame 12 is made of metal, the added bearing surface provided by two projections 162 on the weaker polymeric housing 20 provides a strong connection to absorb the recoil forces from discharging revolver 10 which are distributed over a pair of polymeric projections defining holes 92.

[0031] In one embodiment, lower pinned connection 25 for mounting firing control housing 20 to cylinder frame 12 may be formed by a threaded hole 26 disposed in firing control housing 20 which receives lower retaining pin 19 operably associated with forming a pivot for cylinder 180. In one embodiment, pin 19 includes a shaft having at least a portion being threaded to engage complementary-shaped threads in hole 26. In a preferred embodiment where firing control housing 20 is made of a non-metallic material and pin 19 is metallic, a metallic threaded insert 105 (best shown in FIG. 7) configured to threadably engage pin 19 may be disposed in firing control housing hole 26 to prevent stripping of threads in the generally softer non-metallic housing. In a preferred embodiment, retaining pin 19 may have a head at one end configured to be engaged by a tool such as a slotted, Phillips, or other shaped screwdriver for securing pin 19 to firing control housing 20.

[0032] With continuing reference to FIGS. 1, 6, and 7, retaining pin 19 in one embodiment may be received through a pair of spaced-apart holes 96 defined in a lobed portion 93 formed near the bottom forward section of cylinder frame 12 (see FIGS. 6 and 7). Lobed portion 93 further defines a recess 107 disposed between holes 96 which is configured to receive the lower portion of cylinder frame swing arm 100 with aperture 96. In one embodiment, lobed portion 93 of cylinder frame 12 is received in a complementary-shaped recess 91 formed on a forward portion of firing control housing 20 as best shown in FIGS. 6 and 7. When lobed portion 93 is seated in recess 91 of cylinder frame 12, holes 96 in lobed portion 93, aperture 56 in swing arm 100, and threaded hole 26 in cylinder frame 12 preferably become concentrically aligned so that retaining pin 19 may be inserted therethrough to couple the cylinder frame 12 and cylinder frame 180 to the front of firing control housing 20. Retaining pin 19 is threaded into hole 26 or metallic insert 105 to secure the cylinder frame 12 and firing control housing 20 together.

[0033] It will be appreciated that the foregoing lower pinned connection 25 construction with retaining pin 19 provides a robust attachment of the cylinder frame to the preferably lighter-weight, non-metallic firing control housing that is capable of withstanding recoil forces generated by discharging revolver 10. Unlike the use of polymer grip frames in semi-automatic pistols which have reciprocating slides and recoil springs to absorb the recoil forces, all of the recoil forces generated by revolvers are absorbed by the historically metal cylinder frame and metal grip frames, both of which traditionally have been made of steel and/or aluminum. Therefore, pinned attachment of the metal-to-metal frame components of conventional revolvers using relatively small metal pins and fasteners have heretofore been relied upon to prevent separation of the cylinder frames and grip frames due to recoil forces. This traditional type of mounting technique would lack sufficient strength and be generally unsuitable for coupling a metal cylinder frame to non-metallic firing control housing or similar structure, particularly for the front mount which experiences the highest bending stresses when discharging a revolver. The robust mounting arrangement provided herein provides a secure mount capable of withstanding the recoil forces and stress associated with recoil making the use of lightweight, non-metallic firing control housings possible.

[0034] FIG. 6 shows an exploded perspective view of revolver 10. Cylinder frame 12 defines an opening 15 received cylinder 16. In contrast to conventional larger and heavier metal cylinder frames, the truncated length and reduced size of the metal cylinder frame 12 is made possible by mounting the firing control components in a separate preferably non-metallic and lighter-weight firing control housing 20 (see, e.g. FIGS. 3 and 4). In a preferred embodiment, firing control housing 20 is made of a polymer and includes grip tang 22 to further reduce weight.

[0035] Figures 3-5 show various right side views of the firing control housing 20 with the firing control components supported and mounted therein. As shown in FIG. 3, in one embodiment grip tang 22 is configured to define an opening 41 for receiving an optional rotary mainspring lock 40 and its associated lock housing 42 (shown in FIG. 4) mounted to the grip tang using pins inserted in holes 43. The rotary lock 40 interacts with hammer strut 64 to disable the firing control mechanism.

[0036] Referring now primarily to FIGS. 1-5 and 10, revolver 10 in a preferred embodiment includes a firing control mechanism completely supported by firing control housing 20 that is independent of the cylinder frame 12, and which mechanism generally includes the following firing control components: trigger 11, hammer 18, cylinder lock 32, hammer lever or dog 34, pawl 35, and mainspring assembly 30 with mainspring 31. In one embodiment, mainspring assembly 30 includes mainspring strut 64 having an upper end 150 pinned connection to pin 36 of hammer 18 and a lower end 37 braced against a portion of grip tang 22. In one embodiment shown in the figures, lower end 37 of strut 64 may be engaged with a rotary lock 40 that may be provided and disposed in grip tang
22. Hammer dog 34 is essentially a spring-biased lever that is pivotably mounted to hammer 18 about a pinned connection 52 and is operably positioned between trigger 11 and hammer 18. Hammer dog 34 is biased upwards (clockwise in FIG. 1) by a spring 54 (see FIG. 2) towards hammer 18 and is engageable by the rear of trigger 11. Hammer dog 34 is rotated upwards in response to a trigger pull to fully cock and then release hammer 18 forward for discharging revolver 10 in a conventional double action operating mode. When released, trigger 11 then returns downward and forward after firing to the position shown in FIG. 1.

[0037] Hammer 18 is pivotally mounted to firing control housing 20 about a pinned connection 53 and is movable in rearward and forward arcuate motions. Hammer 18 is biased forward towards the cylinder by mainspring 31 as noted above. As shown in the preferred embodiment, hammer 18 is completely internal and movably disposed in cavity 21 of firing control housing 20. In one embodiment, the upper portion hammer 18 may have a rounded or arcuate profile and upper surface as shown that complements a corresponding inner profile of cavity 21. Since firing control housing 20 is advantageously completely enclosed in the preferred embodiment, foreign debris cannot enter cavity 21 and contaminate the firing mechanism unlike some conventional housing designs which sometimes have an upper opening even when spurless hammers are used. Advantageously, the use of non-metallic materials such as molded polymers for firing control housing 20 makes fabrication of intricate details and curved contours possible and more economical than fabricating comparable metal housings which may require separate and additional machining steps to create these features. In addition, raw production costs associated with molding polymers to form firing control housing as shown and described herein is advantageously significantly less than producing such a housing in metal. Moreover, it should be noted that the smooth, rounded top profile of firing control housing 20 is ideally suited for small concealed-carry revolvers since the revolver will not snag on a user’s clothing when drawn. Although the preferred embodiment is an enclosed spurless hammer, the invention is not be limited to this design and may also include versions with an open slot for a protruding, spurred hammer that can be manually operated by the user.

[0038] With continued reference to FIGS. 1-5 and 10, trigger 11 is pivotally mounted to firing control housing 20 about a pinned connection 38 and moves arcuately in response to a trigger pull by a user. Trigger 11 is biased downwards and forward by trigger torsion spring 33. Cylinder lock 32 is mounted about pinned connection 39 to firing control housing 20 and is actuated by trigger 11. Cylinder lock 32 keeps one of the chambers 13 concentrically aligned with the bore 166 of barrel insert 140 during firing. Cylinder lock 32 is preferably biased upwards by a spring (not shown) into engagement with a cylinder lock depression 50 formed in cylinder 16. Preferably, a cylinder lock depression 50 is provided for each chamber. When trigger 11 is pulled rearwards, a front portion of the trigger ahead of pinned connection 38 rotates downwards (counter-clockwise in FIG. 1) which engages and rotates cylinder lock 32 downwards in an opposite direction (clockwise in FIG. 1) about pin 39. This motion disengages cylinder lock 32 from one of the cylinder lock depressions 50 (see FIG. 1) so that cylinder 16 may be rotated by pawl 35 in a conventional manner to the next firing position in response to pulling the trigger 11. When trigger 11 reaches a predetermined rearward point and a cylinder 13 containing the next cartridge to be discharged aligns with barrel insert 140, cylinder lock 32 is released by the trigger and returns to its initially upward position to engage an new cylinder lock depression 50.

Further rearward motion of hammer 18 releases the hammer to strike and detonate the cartridge directly or indirectly via an intermediate firing pin carried by the cylinder frame 12 positioned between the hammer and cartridge.

[0039] As described above, pulling trigger 11 also cocks and releases hammer 18 to discharge revolver 10. When trigger 11 is pulled, an extension arm 51 projecting rearwards from the trigger engages and rotates hammer dog 34 upwards (clockwise in FIG. 1) which in turn rotates hammer 18 rearwards (clockwise in FIG. 1) to a predetermined point where the hammer is then released to strike a cartridge in one of the chambers 13 or an intermediate firing pin disposed between the hammer and cartridge.

[0040] With continued reference to FIGS. 1-5 and 10, the firing control mechanism of revolver 10 may include a transfer bar 55 in some embodiments. Transfer bar 55 is vertically movable in response to a trigger pull and reduces the likelihood that the revolver will fire in the absence of a trigger pull. In one embodiment, transfer bar 55 may be positioned forward of hammer dog 34 and is movably coupled to trigger 11 via a pinned connection 57. Pawl 35 may also be movably coupled to trigger 11 via same pinned connection 57 or by a different connection. A spring-loaded firing pin 60 (shown in FIGS. 1 and 2 without the spring for clarity) is received in a recess formed in cylinder frame 12 and axially movable therein to strike a cartridge when loaded in chamber 13. When trigger 11 is pulled, transfer bar 55 moves vertically upwards in response and becomes positioned between hammer 18 and firing pin 60. As hammer 18 becomes fully cocked and is then released as described herein, the hammer strikes transfer bar 55 which in turn transfers the force to firing pin 60 propelling the firing pin forward to strike a cartridge. In the absence of a trigger pull, hammer 18 preferably is incapable of reaching firing pin 60 when the hammer is in its forward-most position.

[0041] With reference to FIGS. 1-2, 6, and particularly FIG. 7, cylinder 180 includes an upper support tube 101 that includes a rearward-extending cylindrical portion received in the hub 160 of the cylinder 16 and a forward-extending portion that in one embodiment is received in a complementary shaped recess 70 in the for-
ward portion of cylinder frame 12. In one embodiment best shown in FIG. 6, the forward-extending portion of support tube 101 need not be completely cylindrical in shape since it is disposed in cylinder frame 12 and not the cylindrically-shaped cylinder hub. Support tube 101 rotatably supports cylinder 16 in cylinder frame 12. In a preferred embodiment, upper support tube 101 preferably is hollow to axially slidably receive center pin rod 62 and ejector rod 104 received at least partially in tube 101. Cylinder center pin rod 62 is biased rearwards by spring 102 (best shown in FIG. 7) and axially movable being actuated by a cylinder release latch 61 (shown in FIGS. 1 and 11). Center pin rod 62 allows a user to disengage ejector rod extension 17 from cylinder frame 12 and pivot cylinder 16 laterally outwards from the cylinder frame 12 as further described herein to load cartridges into or eject spent casings from cylinder chambers 13 using ejector 106.

[0042] In one possible embodiment, upper support tube 101 is disposed on top of crane swing arm 100 (best shown in FIG. 6). Support tube 101 may be formed as an integral part of swing arm 100 or may be a separate component attached thereto in other embodiments. Aperture 56 is defined by a lower portion of swing arm 100 to receive crane retaining pin 19 therein.

[0043] Figures 7-9 show one embodiment of a cylinder crane catching system including a latching member such as plunger 72, biasing spring 73, and retaining member such as retaining plug 75. As best shown in FIGS. 8 and 9, retaining plug 75 includes an enlarged front head 80 with hole therein to allow a portion of plunger 72 such as stem 98 to be projected therethrough and a generally cylindrical rear sleeve 81 that is engaged into a cavity 74 formed in cylinder frame 12. At least a portion of plunger 72 is slidably disposed in cavity 74 of cylinder frame 12 as shown, which also houses spring 73. In one embodiment, spring 73 is a helical compression spring. Preferably, a portion of plunger 72 and spring 73 are disposed in sleeve 81 of retaining plug 75. Plunger 72 includes a generally cylindrical rear projection 87 that preferably extends rearwards at least partially into recess 70 through a rear opening 120 in cavity 74 as shown and is slidably received in an axial opening 108 in the tip of end cap 71 such that the plunger contacts and biases cylinder center pin rod 62 rearwards. The rear of rod 62 is actuated by cylinder release latch 61 (see FIGS. 7-10) which in a preferred embodiment has a generally solid structure at the rear except for two small holes for the firing pin 60 and center pin rod 62 (see FIG. 6).

[0045] With reference to FIGS. 7-10, when the user wishes to reload revolver 10, cylinder release latch 61 is depressed which engages the rear of center pin rod 62 and moves the rod forward against spring-loaded plunger 72, which preferably is in contact with the front of the rod as shown. Plunger 72 is forced forward and retracted into cavity 74 while compressing spring 73 (not shown) to a point where cap 71 may be disengaged from the plunger allowing the cylinder 16 to be swung out laterally from cylinder frame 12. After cylinder 16 is swung out and pin rod 62 disengages plunger 72, plunger 72 is free to re-emerge rearwards from cavity 74 into recess 70 under the force of spring 73.

[0046] To return cylinder 16 to cylinder frame 12, the user pushes the cylinder back into the frame. Cap 71 engages plunger 72 forcing the plunger back again into cavity 74 until the hole in the end of the cap becomes concentrically aligned with the plunger which then reenters the cap and returns to the position shown in FIG. 7 before release latch 61 was actuated. To facilitate smooth engagement and movement between cap 71 and plunger 72, the rear portion of the plunger such as rear projection 87 is preferably shaped with a biased surface 82 that engages cap 71 which preferably is cylindrically-shaped. In one embodiment, forward end of cap 71 may also preferably be rounded as shown to facilitate smooth engagement with plunger 72. In one embodiment, biased surface 82 of plunger 72 may be retained in the orientation shown by providing a longitudinal slot 83 in the bottom of plunger sleeve 81 which is adapted and configured to slidably receive a lug 84 on the bottom of the plunger.

[0047] As best shown in FIGS. 7-10, plunger 72 and retaining plug 75 may be retained in cylinder frame 12 in a preferred embodiment without the use of a cross-pin and complex arrangements as used in some conventional revolver designs. Head 80 of retaining plug 75 may be configured with a stepped portion 76 which is engaged by a radially-enlarged flange or boss 77 on the front of barrel insert 140. Preferably, barrel insert 140 may have an internal rifled surface and external threads that engage complementary internal threads in barrel mounting bore 79 in barrel 14 of cylinder frame 12. When barrel insert 140 is threaded into cylinder frame 12, stepped portion 76 of retaining plug 75 is engaged by and trapped
A cylinder latching mechanism for a revolver (10) comprising:

- A cylinder frame (12) having a forwardly open cavity (74);
- A cylinder (16) rotatably mounted in the frame and movable from a ready-to-fire position in the frame to a loading position laterally displaced outwards from the frame; and
- A spring-loaded axially slidable center pin rod (62) extending through the cylinder;
- A spring-loaded plunger (72) slidably disposed in the forwardly open cavity and retained in the frame by a barrel insert (140) axially alignable with a cartridge chamber defined by the cylinder, the plunger operably actuated by a front end of the center pin rod and movable from a locked position in which the cylinder is locked in the ready-to-fire position to an unlocked position in which the cylinder is movable to the loading position; wherein the center pin rod is operable to move the plunger from the locked position to the unlocked position;

Claims

1. A cylinder latching mechanism for a revolver (10) comprising:

- A cylinder frame (12) having a forwardly open cavity (74);
- A cylinder (16) rotatably mounted in the frame and movable from a ready-to-fire position in the frame to a loading position laterally displaced outwards from the frame; and
- A spring-loaded axially slidable center pin rod (62) extending through the cylinder;
- A spring-loaded plunger (72) slidably disposed in the forwardly open cavity and retained in the frame by a barrel insert (140) axially alignable with a cartridge chamber defined by the cylinder, the plunger operably actuated by a front end of the center pin rod and movable from a locked position in which the cylinder is locked in the ready-to-fire position to an unlocked position in which the cylinder is movable to the loading position; wherein the center pin rod is operable to move the plunger from the locked position to the unlocked position;
wherein the plunger (72) is held in the frame (12) by a retaining plug (75) engaged by the barrel insert (140); and wherein the retaining plug (75) includes either a stepped portion (76) which is engaged by a radially-enlarged boss (77) on the barrel insert (140) to trap the retaining plug in the frame (12), or a forward aperture (99) that slidably receives a stem (98) of the plunger (72) therethrough when the plunger is in the unlocked position.

2. The cylinder latching mechanism of claim 1, further comprising a cylinder crane (180) pivotally mounting the cylinder (16) in the frame (12), wherein moving the plunger to the unlocked position allows the cylinder crane to be swung out laterally from the frame by a user.

3. The cylinder latching mechanism of claim 1, wherein the spring-loaded center pin rod (62) has an axial frontal opening (108) that receives a portion of the plunger (72) to lock the cylinder in the ready-to-fire position, or wherein the barrel insert (140) threadably attaches to the frame (12) and defines a bore (166) for receiving a bullet, or further comprising a biasing member (73) biasing the plunger rearwards towards the cylinder (13), or wherein the frame (12) is metal and is attached to a non-metal firing control housing (20) supporting a firing control mechanism.

4. The cylinder latching mechanism of claim 1, wherein the retaining plug (75) includes a rearward extending cylindrical sleeve (81) that slidably receives at least a portion of the plunger (72).

5. The cylinder latching mechanism of claim 4, wherein the sleeve (81) of the retaining plug (75) is at least partially disposed in the cavity (74).

6. The cylinder latching mechanism of claim 4, further comprising a spring (73) biasing the plunger (72) rearward, and being at least partially disposed in the sleeve (81) of the retaining plug (75).

7. A revolver (10) including the cylinder latching mechanism of claim 1.

8. A method of retaining a cylinder latching mechanism in a revolver (10) comprising:

inserting an elongated cylinder latching plunger (72) into an axially-extending forwardly open cavity (74) formed in a revolver cylinder frame (12), the plunger being engageable with a spring-loaded axially slidable center pin rod (62) extending through a cylinder (13) rotatably mounted in the frame and movable from a ready-to-fire position in the frame to a loading position laterally displaced outwards from the frame; inserting a spring (73) into the cavity following the plunger; inserting a retaining plug (75) into the cavity following the spring, the plug engaging the spring; inserting a barrel insert (140) defining a bore (166) for receiving a bullet into the frame; and engaging a portion of the barrel insert (140) with the retaining plug (75) to secure the plug in the cylinder frame (12); wherein the plunger (72) is held in the frame (12) by the retaining plug (75) engaged by the barrel insert (140); and wherein the retaining plug (75) includes either a stepped portion (76) which is engaged by a radially-enlarged boss (77) on the barrel insert (140) to trap the retaining plug in the frame (12), or a forward aperture (99) that slidably receives a stem (98) of the plunger (72) therethrough when the plunger is in the unlocked position.

9. The method of claim 8, wherein the engaging step includes engaging an enlarged boss (77) on the barrel insert with the retaining plug (75).

10. The method of claim 8, wherein the barrel insert inserting step includes threadably engaging the barrel insert (140) with the frame (12).

11. The method of claim 8, wherein during the engaging step a portion (76) of the retaining plug (75) is trapped between the barrel insert (140) and the cylinder frame (12).

12. The method of claim 8, wherein the spring (73) is at least partially received in a hollow cylindrical sleeve (81) of the retaining plug (75) during the step of inserting the retaining plug into the cavity (74), or further comprising a step of extending a portion of the latching plunger (72) through a rear opening (120) of the axially-extending cavity (74).

Patentansprüche

1. Trommelverriegelungsmechanismus für einen Revolver (10), der aufweist:

   einen Trommelrahmen (12) mit einem nach vom offenen Hohlraum (74);
   eine Trommel (16), die drehbar im Rahmen montiert und aus einer abschussbereiten Position im Rahmen in eine Ladeposition beweglich ist, die seitlich nach außen vom Rahmen ver-
schoben ist; und
eine federbelastete axial verschiebbare mittlere Bolzenstange (62), die sich durch die Trommel erstreckt;
einen federbelasteten Kolben (72), der verschiebbar im nach vom offenen Hohlraum angeordnet ist und im Rahmen mittels eines Laufeinsatzes (140) gehalten wird, der axial mit einer Patronenkanne ausgerichtet werden kann, die durch die Trommel definiert wird, wobei der Kolben funktionell durch ein vorderes Ende der mittleren Bolzenstange betätigt wird und aus einer verriegelten Position, in der die Trommel in der abschussbereiten Position verriegelt ist, in eine entriegelte Position beweglich ist, in der die Trommel in die Ladeposition beweglich ist; wobei die mittlere Bolzenstange funktionsfähig ist, um den Kolben aus der verriegelten Position in die entriegelte Position zu bewegen; wobei der Kolben (72) im Rahmen (12) mittels eines Laufeinsatzes (140) in Eingriff gebracht wird; und wobei der Haltestopfen (75) entweder einen abgestuften Abschnitt (76), der mit einem radial vergrößerten Vorsprung (77) am Laufeinsatz (140) in Eingriff gebracht wird, um den Haltestopfen im Rahmen (12) seitlich aus den Rahmen von einem Benutzer ausgeschwenkt werden kann.

2. Trommelverriegelungsmechanismus nach Anspruch 1, der außerdem einen Trommelkran (180) aufweist, der die Trommel (16) im Rahmen (12) dreht und aufnimmt, wobei das Bewegen des Kolbens in die entriegelte Position gestattet, dass der Trommelkran seitlich vom Rahmen von einem Benutzer ausgeschwenkt werden kann.

3. Trommelverriegelungsmechanismus nach Anspruch 1, bei dem die federbelastete mittlere Bolzenstange (62) eine axiale frontale Öffnung (108) aufweist, die einen Abschnitt des Kolbens (72) aufnimmt, um die Trommel in der abschussbereiten Position zu verriegeln, oder bei dem der Laufeinsatz (140) verschraubbar am Rahmen (12) befestigt ist und eine Bohrung (166) für das Aufnehmen eines Geschosses definiert, oder der außerdem ein Vorspannelement (73) aufweist, das den Kolben nach hinten in Richtung der Trommel (13) vorspannt, oder bei dem der Rahmen (12) aus Metall besteht und an einem nichtmetallischen Abschusssteuerungsgehäuse (20) befestigt ist, das einen Abschusssteuerungsmechanismus trägt.

4. Trommelverriegelungsmechanismus nach Anspruch 1, bei dem der Haltestopfen (75) eine sich nach hinten erstreckende zylindrische Buchse (81) umfasst, die verschiebbare mindestens einen Abschnitt des Kolbens (72) aufnimmt.

5. Trommelverriegelungsmechanismus nach Anspruch 4, bei dem die Buchse (81) des Haltestopfens (75) mindestens teilweise im Hohlraum (74) angeordnet ist.

6. Trommelverriegelungsmechanismus nach Anspruch 4, der außerdem eine Feder (73) aufweist, die den Kolben (72) nach hinten vorspannt, und die mindestens teilweise in der Buchse (81) des Haltestopfens (75) angeordnet ist.

7. Revolver (10), der einen Trommelverriegelungsmechanismus nach Anspruch 1 umfasst.

8. Verfahren zum Halten eines Trommelverriegelungsmechanismus in einem Revolver (10), das die folgenden Schritte aufweist:

Einsetzen eines länglichen Trommelverriegelungskolbens (72) in einen sich axial erstreckenden nach vom offenen Hohlraum (74), der in einem Revolver trommelrahmen (12) gebildet wird, wobei der Kolben mit einer federbelasteten axial verschraubbaren mittleren Bolzenstange (62) in Eingriff gebracht werden kann, die sich durch eine Trommel (13) erstreckt, drehbar im Rahmen montiert und aus einer abschussbereiten Position im Rahmen in eine Ladeposition beweglich, die seitlich nach außen vom Rahmen verschoben ist; Einsetzen einer Feder (73) in den Hohlraum nach dem Kolben; Einsetzen eines Haltestopfens (75) in den Hohlraum nach der Feder, wobei der Stopfen mit der Feder in Eingriff kommt; Einsetzen eines Laufeinsatzes (140), der eine Bohrung (166) für das Aufnehmen eines Geschosses im Rahmen definiert; und Ineingriffbringen eines Abschnittes des Laufeinsatzes (140) mit dem Haltestopfen (75), um den Stopfen im Trommelrahmen (12) zu sichern; wobei der Kolben (72) im Rahmen (12) mittels des Haltestopfens (75) gehalten wird, der durch den Laufeinsatz (140) in Eingriff gebracht wird; und wobei der Haltestopfen (75) entweder einen abgestuften Abschnitt (76), der mit einem radial vergrößerten Vorsprung (77) am Laufeinsatz (140) in Eingriff gebracht wird, um den Haltestopfen im Rahmen (12) einzuschließen, oder eine vordere Öffnung (99) umfasst, die verschiebbare Stange (98) des Kolbens (72)
dort hindurch aufnimmt, wenn sich der Kolben in der entriegelten Position befindet.

9. Verfahren nach Anspruch 8, bei dem der Schritt des Ineintritts das Eingreifen eines vergrößerten Vorsprungs (77) am Laufeinsatz mit dem Haltestopfen (75) umfasst.

10. Verfahren nach Anspruch 8, bei dem der Schritt des Einsetzens des Laufeinsatzes das verschraubbare Ineintrittsbringen des Laufeinsatzes (140) mit dem Rahmen (12) umfasst.

11. Verfahren nach Anspruch 8, bei dem während des Schrittes des Eingreifens ein Abschnitt (76) des Haltestopfens (75) zwischen dem Laufeinsatz (140) und dem Trommelrahmen (12) eingeschlossen wird.

12. Verfahren nach Anspruch 8, bei dem die Feder (73) mindestens teilweise in einer hohlen, zylindrischen Buchse (81) des Haltestopfens (75) während des Schrittes des Einsetzens des Haltestopfens in den Hohlraum (74) aufgenommen wird, oder das außerdem einen Schritt des Ausziehens eines Abschnittes des Verriegelungskolbens (72) durch eine hintere Öffnung (120) des sich axial erstreckenden Hohlräumes (74) aufweist.

Revendications

1. Mécanisme de verrouillage de barillet pour un révolver (10), comprenant :
   une carcasse du barillet (12) comportant une cavité ouverte vers l’avant (74) ;
   un barillet (16), monté de manière rotative dans la carcasse et pouvant être déplacé d’une position prête au tir dans la carcasse vers une position de chargement, déplacée latéralement vers l’extérieur de la carcasse ;
   une tige axiale centrale à glissement axial et chargée par ressort (62), s’étendant à travers le barillet ;
   un piston chargé par ressort (72), agencé de manière coulissante dans la cavité ouverte vers l’avant et retenu dans la carcasse par un adaptateur sous-calibre (140), pouvant être aligné axialement avec une chambre de cartouche définie par le barillet, le piston étant destiné à être actionné par une extrémité avant de la tige axiale centrale et pouvant se déplacer d’une position verrouillée, dans laquelle le barillet est verrouillé dans la position prête au tir, vers une position déverrouillée, dans laquelle le barillet peut être déplacé vers la position de chargement ;
   dans lequel la tige axiale centrale sert à déplacer le piston de la position verrouillée vers la position déverrouillée ;
   dans lequel le piston (72) est retenu dans la carcasse (12) par un bouchon de retenue (75) engagé dans l’adaptateur sous-calibre (140) ; et
   dans lequel le bouchon de retenue (75) englobe ou bien une partie étagée (76), dans laquelle s’engage un bossage à élargissement radial (77) sur l’adaptateur sous-calibre (140) pour pénétrer le bouchon de retenue dans la carcasse (12) ; ou bien une ouverture avant (99), recevant de manière coulissante une tige (98) du piston (72) lorsque le piston se trouve dans la position déverrouillée.

2. Mécanisme de verrouillage de barillet selon la revendication 1, comprenant en outre un bras de support du barillet (180) assurant le montage pivotant du barillet (16) dans la carcasse (12), dans lequel le déplacement du piston vers la position déverrouillée permet le basculement du bras de support du barillet latéralement hors de la carcasse par un utilisateur.

3. Mécanisme de verrouillage de barillet selon la revendication 1, dans lequel la tige axiale centrale chargée par ressort (62) comporte une ouverture frontale axiale (108), recevant une partie du piston (72) pour verrouiller le barillet dans la position prête au tir ; ou dans lequel l’adaptateur sous-calibre (140) est fixé par filetage sur la carcasse (12) et définit un alésage (166) pour recevoir une balle ; ou comprenant en outre un élément pousoir (73), poussant le piston vers l’arrière, en direction du barillet (13) ; ou dans lequel la carcasse (12) est composée de métal et est fixée sur un boîtier de commande de tir non métallique (20), supportant un mécanisme de commande de tir.

4. Mécanisme de verrouillage de barillet selon la revendication 1, dans lequel le bouchon de retenue (75) englobe un manchon cylindrique s’étendant vers l’arrière (81), recevant de manière coulissante au moins une partie du piston (72).

5. Mécanisme de verrouillage de barillet selon la revendication 4, dans lequel le manchon (81) du bouchon de retenue (75) est au moins partiellement agencé dans la cavité (74).

6. Mécanisme de verrouillage de barillet selon la revendication 4, comprenant en outre un ressort (73), poussant le piston (72) vers l’arrière, et étant au moins partiellement agencé dans le manchon (81) du bouchon de retenue (75).

7. Révolver (10), englobant un mécanisme de verrouillage du barillet selon la revendication 1.
8. Procédé de retenue d’un mécanisme de verrouillage de barillet dans un révolver (10), comprenant les étapes ci-dessous :

   insertion d’un piston de verrouillage allongé du barillet (72) dans une cavité ouverte, à extension axiale et ouverte vers le haut (74), formée dans une carcasse du barillet du révolver (12), le piston pouvant s’engager dans une tige axiale centrale à glissement axial et chargée par ressort (62), s’étendant à travers un barillet (13), monté de manière rotative dans la carcasse et pouvant se déplacer d’une position prête au tir dans la carcasse vers une position de chargement, déplacée latéralement vers l’extérieur par rapport à la carcasse ;

   insertion d’un ressort (73) dans la cavité, après le piston ;

   insertion d’un bouchon de retenue (75) dans la cavité, après le ressort, le bouchon s’engageant dans le ressort ;

   insertion d’un adaptateur sous-calibre (140), définissant un alésage (166) pour recevoir une balle dans la carcasse ;

   engagement d’une partie de l’adaptateur sous-calibre (140) dans le bouchon de retenue (75) pour fixer le bouchon dans la carcasse du barillet (12) ;

   dans lequel le piston (72) est retenu dans la carcasse (12) par un bouchon de retenue (75) engagé dans l’adaptateur sous-calibre (140) ; et dans lequel le bouchon de retenue (75) englobe ou bien une partie étagée (76), dans laquelle il s’engage un bossage à élargissement radial (77) sur l’adaptateur sous-calibre (140), pour piéger le bouchon de retenue dans la carcasse (12) ; ou bien une ouverture avant (99), recevant de manière coulissante une tige (98) du piston (72) lorsque le piston se trouve dans la position déverrouillée.

9. Procédé selon la revendication 8, dans lequel l’étape d’engagement englobe l’engagement d’un bossage élargi (77) sur l’adaptateur sous-calibre dans le bouchon de retenue (75).

10. Procédé selon la revendication 8, dans lequel l’étape d’insertion de l’adaptateur sous-calibre englobe l’engagement par filetage de l’adaptateur sous-calibre (140) dans la carcasse (12)

11. Procédé selon la revendication 8, dans lequel, au cours de l’étape d’engagement, une partie (76) du bouchon de retenue (75) est piégée entre l’adaptateur sous-calibre (140) et la carcasse du barillet (12).

12. Procédé selon la revendication 8, dans lequel le ressort (73) est au moins partiellement reçu dans un manchon cylindrique creux (81) du bouchon de retenue (75) au cours de l’étape d’insertion du bouchon de retenue dans la cavité (74) ; ou comprenant en outre une étape d’extension d’une partie du piston de verrouillage (72) à travers une ouverture arrière (120) de la cavité à extension axiale (74).
REFERENCES CITED IN THE DESCRIPTION

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